PATENT ABSTRACTS OF JAPAN

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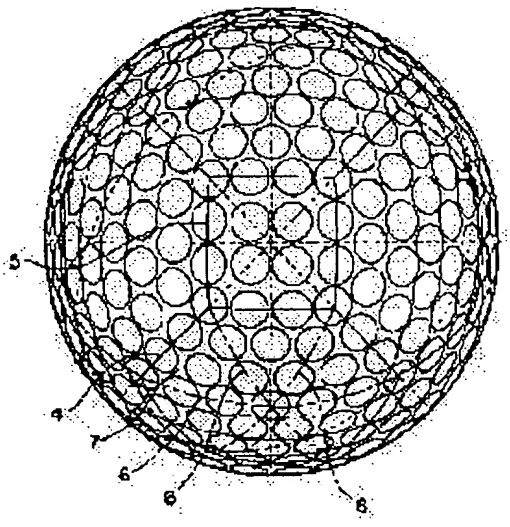
(54) GOLF BALL AND ITS MANUFACTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the flight distance and aerodynamic symmetric property by obtaining the volume of a virtual ball assumed to have no dimple on its spherical surface and the total capacity of dimples on the ball surface, and setting the ratio of the total capacity of all dimples against the ball volume in a specific range.



SOLUTION: The total capacity ratio VR of all dimples against the ball volume expressed by (B/A)×100 is set in the range of 0.6%<VR<1.5%, where Amm3 is the volume of virtual ball assumed to have no dimple on its surface, and Bmm3 is the total capacity of all dimples provided on the ball surface. 12 virtual spherical regular hexagons 4 and six congruent virtual spherical regular squares 5 are drawn on the ball surface, and three diagonal lines 6 are drawn on each regular hexagon 4 to divide each regular hexagon 4 into six virtual spherical triangles 7 respectively. Dimples are arranged at the same dimple layout in the triangles 7 and the regular

squares 5.

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CLAIMS

[Claim(s)]
[Claim 1] In a golf ball with which one does not exist [a great circle which does not intersect a dimple] in the surfac Volume of a virtual ball at the time of assuming that there is no dimple on the surface of [spherical] a ball is set to Amm3. A golf ball characterized by a ratio VR of the total capacity of all dimples occupied for ball volume shown b (B/A) 100 when total in the whole golf ball of capacity of a dimple prepared on the surface of a ball is set to Bmm3 being 0.6%<VR<1.5%.
[Claim 2] On the ball surface, a congruent virtual spherical-surface equilateral hexagon of 12 pieces, and six congrue virtual spherical-surface equilateral quadrangles It draws so that it may be common in each one side of a virtual spherical-surface equilateral hexagon of four pieces to which it is surrounded by virtual spherical-surface equilateral hexagon each virtual spherical-surface equilateral quadrangle of whose is four pieces, and the four sides of each virtu spherical-surface equilateral quadrangle surround the virtual spherical-surface equilateral quadrangle concerned. Furthermore, by drawing the three diagonal lines on a total virtual spherical-surface equilateral hexagon, respectively and carrying out the division-into-equal-parts rate of each virtual spherical-surface equilateral hexagon to a virtual spherical triangle of six pieces The ball surface is divided into a virtual spherical triangle of 72 pieces, and six virtua spherical-surface equilateral quadrangles. A golf ball according to claim 1 which arranged a dimple on the ball surfa so that the inside of each above-mentioned virtual spherical triangle might serve as the same dimple array and the inside of each above-mentioned virtual spherical-surface equilateral quadrangle might serve as the same dimple array
[Claim 3] A golf ball according to claim 2 with which a dimple of the same number intersects each sides of all that form a virtual spherical triangle of 72 pieces, and six virtual spherical-surface equilateral quadrangles.
[Claim 4] While forming a spherical mold cavity which joins a half-mold of a pair with which much heights for dimp shaping were formed in a semi-sphere-like mold cavity inside disengageable and by which much heights for dimple shaping were formed in inner skin In a manufacture method of a golf ball which fabricates around a core a cover lay which carries out arrangement maintenance of the core in a core in this spherical mold cavity, supplies a covering molding material to a gap formed between this core and mold cavity inner skin, and has many dimples Establish a ******** mold cavity and two or more pin insertion slots open for free passage in a both above-mentioned ** type mating face, and a dimple shaping pin is arranged in this pin insertion slot so that a point may project in a mold cavit Form heights for dimple shaping on a parting line of a mold cavity by point of this dimple shaping pin, and a great circle which does not intersect the above-mentioned heights for dimple shaping at inner skin constitutes a mold cavit in which one does not exist. A manufacture method of a golf ball characterized by manufacturing a golf ball of a publication in any 1 term of claims 1-3.
[Claim 5] Arrange a dimple shaping pin possible [an attitude], make it march out in a mold cavity of metal mold, an a core is held to a core of a mold cavity by this dimple shaping pin. A covering molding material is supplied to a gap formed between a core and mold cavity inner skin in this condition. A manufacture method of a golf ball according t claim 4 which the above-mentioned dimple shaping pin is retreated to a dimple formation location just before filling with a covering molding material completely, and formed a dimple on a parting line of metal mold.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] Good flight distance is obtained and this invention relates to the manufacture method of the golf ball excellent in the aerodynamic symmetric property which produced a difference neither on flight distance nor a bailistic trajectory with a blow location, and was stabilized and which flies and demonstrates the engine performance, and this golf ball.
[0002]
[Description of the Prior Art] Since the dimple array and dimple configurations in a golf ball (a diameter, the depth, cross-section configuration, etc.) have big effect on the jump engine performance of a golf ball, in order that they ma raise the jump engine performance of a golf ball from the former, the geometric arranging method make the golf ball surface arrange many dimples equally or densely is proposed variously.
[0003] In this case, the request of a player to the jump engine performance of a golf ball has most things about increa of flight distance, and many players desire increase of the further flight distance.
[0004] Moreover, there is aerodynamic symmetric property as important jump engine performance of a golf ball. Th requires that a difference should arise neither on flight distance nor a ballistic trajectory wherever it may be specified the attached regulation of a golf regulation (Japan Golf Association), III, and a ball (C) and may hit [of a ball]. The conventional golf ball by which current marketing is carried out does not reach the level which all players may fully satisfy although it has this symmetric property in the range specified to the above-mentioned regulation, but the furth improvement is desired also about aerodynamic symmetric property.
[0005] That is, the so-called seam line exists and the usual golf ball by which current marketing is carried out is set t one of the causes by which this seam line degrades aerodynamic symmetric property. Although this seam line is a virtual great circle which the dimple formed in the joint of that metal mold and metal mold does not intersect and exi in a golf ball unavoidably on that manufacture since a golf ball is fabricated with the metal mold with a semi-sphere-like shaping side of a 2nd page rate In the golf ball which has this seam line As shown in drawing 8 So that the straig line e passing through the two central point d of c, c, and Ball a which counters mutually [the seam line b] may serv as the axis of rotation It is easy to produce a difference in the ballistic trajectory and flight distance of a ball in seam **** (drawing 8 (B)) blow i Carried out as [serve as / the straight line h passing through the two-poles point (pole) and the central point d when making into the equator pole **** (drawing 8 (A)) and the seam line b to blow f carry out / the axis of rotation].
[0006] In this case, even if it is some, especially when an unsymmetrical ball is used aerodynamically, in the golfer's an upper person or a pro's level, this asymmetry may lead to destabilization of a shot and improvement in this aerodynamic symmetric property is also an important technical problem on the improvement in the jump engine performance of a golf ball.
[0007] This invention was made in view of the above-mentioned situation, and aims at offering the manufacture method of of the outstanding golf ball which flies and has the engine performance and this outstanding golf ball fligh distance and whose aerodynamic symmetric property improved.
[0008]
[The means for solving a technical problem and the gestalt of implementation of invention] In the golf ball with whic one does not exist [the great circle which does not intersect a dimple] in (1) surface in order that this invention may

attain the above-mentioned purpose Volume of the virtual ball at the time of assuming that there is no dimple on the surface of [spherical] ball is set to Amm3. The ratio VR of the total capacity of all the dimples occupied for the ba volume shown by x(B/A) 100 when total in the whole golf ball of the capacity of the dimple prepared on the surface the ball is set to Bmm3 On the golf ball and (2) ball surface which are characterized by being 0.6%<VR<1.5%, the congruent virtual spherical-surface equilateral hexagon of 12 pieces, and six congruent virtual spherical-surface equilateral quadrangles It draws so that it may be common in each one side of the virtual spherical-surface equilatera hexagon of four pieces to which it is surrounded by the virtual spherical-surface equilateral hexagon each virtual spherical-surface equilateral quadrangle of whose is four pieces, and the four sides of each virtual spherical-surface equilateral quadrangle surround the virtual spherical-surface equilateral quadrangle concerned. Furthermore, by drawing the three diagonal lines on a total virtual spherical-surface equilateral hexagon, respectively, and carrying ou the division-into-equal-parts rate of each virtual spherical-surface equilateral hexagon to the virtual spherical triangle six pieces The ball surface is divided into the virtual spherical triangle of 72 pieces, and six virtual spherical-surface equilateral quadrangles. The golf ball of the above (1) which arranged the dimple on the ball surface so that the insid of each above-mentioned virtual spherical triangle might serve as the same dimple array and the inside of each above mentioned virtual spherical-surface equilateral quadrangle might serve as the same dimple array, And the golf ball of the above (2) with which the dimple of the same number intersects each sides of all that form a (3) 72 piece virtual spherical triangle and six virtual spherical-surface equilateral quadrangles is offered.

[0009] Namely, while preventing the fall of the symmetric property resulting from existence of the seam line which arranged the dimple and was mentioned above so that one may not exist, the great circle which does not intersect a dimple on the surface the golf ball of above-mentioned this invention By arranging a dimple so that the ratio (the dimple total volume ratio) VR of the total capacity of all the dimples occupied for ball volume may serve as the abov mentioned value, the volume ratio of a dimple is rationalized and increase of flight distance is attained.

[0010] In this case, the ball surface is divided into the virtual spherical triangle of 72 pieces, and six virtual spherical surface equilateral quadrangles like the above (2). By arranging a dimple so that the inside of each above-mentioned virtual spherical triangle may serve as the same dimple array and the inside of each above-mentioned virtual spherica surface equilateral quadrangle may serve as the same dimple array A dimple can be arranged so that all the surfaces a ball may be covered and the equal dimple effect may be acquired, and aerodynamic symmetric property can be rais more certainly. Still like the above (3) So that the dimple of the same number may intersect each sides of all that form the virtual spherical triangle of 72 pieces, and six virtual spherical-surface equilateral quadrangles By arranging a dimple, the distance between dimples becomes equal with the whole ball, and can obtain the golf ball which has the extremely excellent aerodynamic symmetric property.

[0011] moreover, this invention as the manufacture method for obtaining the golf ball of above-mentioned this invention (4) While forming the spherical mold cavity which joins the half-mold of a pair with which much heights f dimple shaping were formed in the semi-sphere-like mold cavity inside disengageable and by which much heights fo dimple shaping were formed in inner skin In the manufacture method of the golf ball which fabricates around a core cover layer which carries out arrangement maintenance of the core in the core in this spherical mold cavity, supplies covering molding material to the gap formed between this core and mold cavity inner skin, and has many dimples Establish a ******** mold cavity and two or more pin insertion slots open for free passage in a both above-mention ** type mating face, and a dimple shaping pin is arranged in this pin insertion slot so that a point may project in a mo cavity. Form the heights for dimple shaping on the parting line of a mold cavity by the point of this dimple shaping p and the great circle which does not intersect the above-mentioned heights for dimple shaping at inner skin constitute the mold cavity in which one does not exist. The above (1) The manufacture method of the golf ball characterized by manufacturing one golf ball of - (3), And arrange (5) dimple shaping pin possible [an attitude], make it march out in the mold cavity of metal mold, and a core is held to the core of a mold cavity by this dimple shaping pin. A covering molding material is supplied to the gap formed between a core and mold cavity inner skin in this condition. Just befo filling up with a covering molding material completely, the above-mentioned dimple shaping pin is retreated to a dimple formation location, and the manufacture method of the golf ball the above (4) in which the dimple was forme on the parting line of metal mold is offered.

[0012] Namely, while the manufacture method of above-mentioned this invention arranges a core in the mold cavity this metal mold using the molding die of the 2nd page rate which consists of a half-mold of the pair which has a sem sphere-like mold cavity and injection molding a covering molding material around this core While preparing the

heights for dimple shaping formed in the mold cavity inner skin of the above-mentioned metal mold so that the dimp array of above-mentioned (1) - (3) may be satisfied in case a dimple is formed in this covering A dimple shaping pin arranged in a both ** type mating face so that the point may project in a mold cavity. By forming the heights for dimple shaping on the parting line of a mold cavity by the point of this dimple shaping pin, and forming a dimple on the parting line of metal mold by this dimple shaping pin point The golf ball with which one does not exist [the grea circle which does not intersect a dimple] is obtained on the surface.

[0013] In this case, until just before arranging the above-mentioned dimple shaping pin possible [an attitude] and being filled up with a covering molding material like the above (5), it can be used as a support pin which holds the c in a mold cavity to the core of this mold cavity.

[0014] Hereafter, lessons is taken from this invention and it explains in more detail. The golf ball of this invention is constituted so that the ratio (the dimple total volume ratio) VR of the total capacity of all the dimples that do not hav at all the great circle which a dimple does not intersect as mentioned above, and are occupied for the above-mentione ball volume may become 0.6%<VR<1.5%.

[0015] When volume of the virtual ball at the time of assuming that the above-mentioned dimple total volume ratio V does not have a dimple on the surface of [spherical] a ball is set to Amm3 and total in the whole golf ball of the capacity of the dimple prepared on the surface of the ball is set to Bmm3, it is the value shown by x(B/A) 100. It can ask for the volume A of the above-mentioned virtual ball by A=4/3x(radius of virtual ball)3xpi like the case where it asks for the volume of the usual ball here. Moreover, the total B of the above-mentioned dimple capacity For examp what is necessary is to ask by x (capacity of one dimple (VD)) (total of a dimple), when the number of dimples is on and just to add these in quest of total of the capacity similarly about each dimple, when there are two or more sorts o dimples further. In this case, as shown in drawing 1 (A) and (B), the above-mentioned dimple capacity VD can make x axis the straight line on the virtual plane which intersects perpendicularly with the y-axis and this y-axis the straigh line which passes along Dm, the deepest section of a dimple 1, and the center of the virtual plane 3 the diameter of th circular virtual plane 3 surrounded by the rim 2 of a dimple 1, and can ask for it by the following formula (1).

[0016]

[Equation 1]

$$VD=\int_0^{Dm/2} 2\pi xydx \qquad \cdots (1)$$

[0017] in addition, one sort from which the class of dimple formed in the ball surface in this invention differs in a diameter and/or the depth mutually -- or two or more sorts are preferably made into about 1-3 kinds. Although the number of dimples will decrease if especially the magnitude of one dimple is not restricted, its number of dimples naturally increases a dimple in order to satisfy a small thing, then the above-mentioned dimple total volume ratio VR and it enlarges a dimple, about 2-5mm and the depth usually have [the diameter of a dimple] about 0.07-0.30mm desirable [moreover,]. As for the total B of the above-mentioned dimple capacity, it is desirable that 3, and 325-447mm thing which becomes about three are especially desirable, and especially 250-600 dimple totals consider as 350-500 pieces 244-610mm.

[0018] The golf ball of this invention designs a dimple so that the dimple total volume ratio VR called for by doing i this way may exceed 0.6% and it may become less than 1.5%, and preferably, it designs a dimple so that VR may become 0.85 - 0.95% more preferably 0.8 to 1%. Although the lift which a turbulent flow can be effectively generate to the perimeter of a ball during a golf ball flight by this, and air resistance can be decreased, and is produced in connection with the backspin of a golf ball can be rationalized and the flight distance of a golf ball can be increased I this case, in this invention, while making the above-mentioned dimple total volume ratio VR into the above-mention value The great circle which does not intersect the ball surface with a dimple raises the aerodynamic symmetric property mentioned above by arranging a dimple, as not existed in one, either, and it raises flight distance and symmetric property to coincidence.

[0019] The array of a dimple may be which array here, as long as it makes it the great circle which a dimple does no intersect as mentioned above not arise on the ball surface. Although the ball surface can be divided by well-known s plot experiments, such as positive 8 face piece, positive 12 face piece, and positive 20 face piece, and a dimple can b equally arranged to each division field The ball surface is divided into the virtual spherical triangle of 72 pieces, and virtual spherical-surface equilateral quadrangles especially in this invention. So that the inside of each above-

mentioned virtual spherical triangle may serve as the same dimple array and the inside of each above-mentioned virt spherical-surface equilateral quadrangle may serve as the same dimple array It can be desirable to arrange a dimple a aerodynamic symmetric property can be raised more certainly by this. Furthermore, so that the dimple of the same number may intersect each sides of all that form the virtual spherical triangle of the 72 above-mentioned pieces, and six above-mentioned virtual spherical-surface equilateral quadrangles in this case It is more desirable to arrange a dimple, and thereby, the distance between dimples becomes equal with the whole ball, and can obtain the golf ball which has the extremely excellent aerodynamic symmetric property.

[0020] The array specifically shown in drawing 2 , the array shown in 3, the array shown in drawing 4 , and drawing can be illustrated. As shown in drawing 2 -5, mutually with the congruent virtual spherical-surface equilateral hexag 4 of 12 pieces on the ball surface namely, six congruent virtual spherical-surface equilateral quadrangles 5 It draws s that it may be common in each one side of the virtual spherical-surface equilateral hexagon 4 of four pieces to which each virtual spherical-surface equilateral quadrangle 5 is surrounded by the virtual spherical-surface equilateral hexagon 4 of four pieces, and the four sides of each virtual spherical-surface equilateral quadrangle 5 surround the virtual spherical-surface equilateral quadrangle 5 concerned. Furthermore, the thing for which the three diagonal line 6, 6, and 6 are drawn on the total virtual spherical-surface equilateral hexagon 4, respectively, and each virtual spherical-surface equilateral hexagon 4 is divided into the virtual spherical triangle 7--7 of six pieces (by a diagram) The ball surface which showed the diagonal line 6 only to the virtual spherical-surface hexagon of 1 is divided into t virtual spherical triangle 7 of 72 pieces, and six virtual spherical-surface equilateral quadrangles 5. A dimple is arranged so that the inside of each above-mentioned virtual spherical triangle 7 may serve as the same dimple array a the inside of each above-mentioned virtual spherical-surface equilateral quadrangle 5 may serve as the same dimple array.

[0021] Furthermore, as for the number of the dimples which it is desirable to make into the same number (3 four and drawing 4 drawing 2 and five) the number of dimples which crosses each side which forms each above-mentioned virtual spherical triangle 7 and each virtual spherical-surface equilateral quadrangle 5 like drawing 2 , the array of 3, and the array of drawing 4 , and cross each side in this case, it is desirable to usually consider as 3-5 pieces.

[0022] In addition, the above-mentioned drawing 2 -5 do not explain the split plot experiment on the surface of a bal dimple array is not limited to these arrays, but the inside of each above-mentioned virtual spherical triangle 7 serves the same dimple array, and it should just turn into a dimple array with the same inside of each above-mentioned virtu spherical-surface equilateral quadrangle 5. Moreover, the method of dividing the ball surface into the virtual spherica surface equilateral hexagon 4 of the 12 above-mentioned pieces and six virtual spherical-surface equilateral quadrangles 5 can be performed by the following method.

[0023] Namely, as shown in drawing 6 , while drawing the median line 21--21 from each top-most vertices of each spherical-surface equilateral triangle which divides the ball surface into positive 8 well-known face piece first (the inside of drawing and a reference mark 20 are the parting line of positive 8 face piece), and constitutes spherical-surface positive 8 obtained face piece By drawing the above-mentioned virtual spherical-surface equilateral quadran 5 on the sense to which a vertical angle is located in each top-most-vertices field of the spherical-surface positive 8 above-mentioned face piece on the above-mentioned median line 21, and forming the above-mentioned virtual spherical-surface equilateral hexagon 4 further in one side and the above-mentioned median line 21 of this virtual spherical-surface equilateral quadrangle 5 The ball surface can be divided into the virtual spherical-surface equilatera hexagon 4 of 12 pieces, and six virtual spherical-surface equilateral quadrangles 5.

[0024] The golf ball of this invention arranges a dimple as mentioned above, and there is especially no limit in structure, a material, etc. of a ball, and it is good for them also as a spool golf ball also as solid golf balls, such as a o piece ball and a two-piece ball, using the usual material. Furthermore, magnitude, weight, etc. can be suitably set up according to a golf regulation.

[0025] moreover, in the manufacture method's also being able to adopt the usual method, for example, considering a two-piece solid golf ball While forming the spherical mold cavity which joins the half-mold of a pair with which mu heights for dimple shaping were formed in the semi-sphere-like mold cavity inside disengageable and by which muc heights for dimple shaping were formed in inner skin Although it can manufacture by the method of fabricating arou a core the cover layer which carries out arrangement maintenance of the core in the core in this spherical mold cavity supplies a covering molding material to the gap formed between this core and mold cavity inner skin, and has many dimples As the golf ball of this invention was mentioned above, the great circle which one dimple does not intersect,

either is that to which one does not exist in the ball surface. Therefore, it is necessary to fabricate so that the seam lin (great circle which a dimple does not intersect) formed in the metal mold parting plane which existed in the conventional golf ball may not be generated.

[0026] As a method of fabricating such a golf ball For example, as shown in drawing 7 , the ******** mold cavity 9 and two or more pin insertion slots 10 and 10 open for free passage are established in the mating face of both the ** types 8a and 8b that constitute metal mold. The dimple shaping pins 11 and 11 are arranged in these pin insertion slo 10 and 10 so that a point may project in a mold cavity 9. The heights for dimple shaping are formed on the parting li of a mold cavity 9 by the point of these dimple shaping pins 11 and 11, and the method it is made for the above-mentioned seam line not to produce is adopted preferably. In addition, the reference marks 12 in drawing 7 are the co of a golf ball, and the cover layer by which 13 was fabricated.

[0027] Furthermore, when this invention golf ball is manufactured by the method of this drawing 7 , Arrange the above-mentioned dimple shaping pins 11 and 11 possible [an attitude], make it march out in the mold cavity 9 of metal mold, and a core 12 is held to the core of a mold cavity 9 by these dimple shaping pins 11 and 11. A covering molding material is supplied to the gap formed between a core 12 and mold cavity 9 inner skin in this condition. Just before filling up with a covering molding material completely, the above-mentioned dimple shaping pins 11 and 11 a retreated to a dimple formation location (illustrated condition), and a dimple can be formed on the parting line of me mold.

[0028] In addition, although one does not exist, the great circle which does not intersect the heights for dimple shapi at inner skin the mold cavity of the metal mold which fabricates the golf ball of this invention Furthermore, volume o the virtual ball at the time of assuming that there is no dimple in the spherical surface of the golf ball obtained is set Amm3. The ratio (the dimple total volume ratio) VR of the total capacity of all the dimples occupied for the ball volume shown by x(B/A) 100 when total in the whole ball of the capacity of the above-mentioned dimple is set to Bmm3 The above-mentioned heights for dimple shaping are designed so that the golf ball used as 0.6%<VR<1.5% m be obtained, and the golf ball of this invention which has the dimple array which this mentioned above is obtained.

[0029]

[Effect of the Invention] According to this invention, the following effects can be acquired as explained above.

(1) The ratio of the dimple total capacity to the volume of the whole ball can be rationalized.

(2) The ball with which one does not exist [the great circle which does not intersect a dimple] is obtained.

(3) The geometric array of a dimple is improved and a golf ball with an equal distance between dimples is obtained.

(4) A ball without a seam line is obtained by the heights for dimple formation prepared in the metal mold parting pla

Therefore, when the outstanding flight distance is obtained, the good stable golf ball of symmetry nature which flies according to the difference in the blow part of a ball, and a difference does not produce for the engine performance which flies and has the engine performance is obtained.

[0030]

[Example] Next, although an example and the example of a comparison show the effect of this invention concretely, this invention is not limited to the following example.

[0031] Drawing 2 and the two-piece solid golf ball of the large size which has the dimple array shown in 3 were manufactured using the molding die of drawing 7 mentioned above. This golf ball is 380 dimple numbers, 3.8mm (o kind) of diameters of a dimple, and 0.92% of VR values.

[0032] The pole blow (the direction of (A) drawing arrow head f) and seam blow (the direction of (B) drawing arrow head i) which were shown in drawing 8 (A) and (B) were performed having assumed the great-circle portion which i equivalent to the parting plane of metal mold in this golf ball to be a seam line, and a carry, a run, and total flight distance were measured. A result is shown in a table 1. Moreover, measurement same about the two-piece solid golf ball (those with a seam line, the number of dimples which a dimple does not intersect 392 pieces, 3.63mm (one kind diameters of a dimple, 0.92% of VR values) of the large size which has drawing 9 formed with the material same as comparison and the dimple array shown in 10 was performed. A result is written together to a table 1. In addition, us the swing robot, by head speed 45 m/sec, the blow was made as the repeat 10 times and the blow test made the avera measured value with the driver (driver).

[0033]

[A table 1]

		実施例	比較例
キャリー	ボール打撃（m）	213	213
	シーム打撃（m）	214	211
ラン	ボール打撃（m）	14	11
	シーム打撃（m）	13	15
トータル	ボール打撃（m）	227	224
	シーム打撃（m）	227	226

[0034] To the top where this invention golf ball has good symmetry nature, flight distance also increased and has checked the outstanding thing for which it flies and has the engine performance as shown in a table 1.

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TECHNICAL FIELD

[A technical field to which invention belongs] Good flight distance is obtained and this invention relates to a manufacture method of a golf ball excellent in aerodynamic symmetric property which produced a difference neither flight distance nor a ballistic trajectory with a blow location, and was stabilized and which flies and demonstrates engine performance, and this golf ball.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the following effects can be acquired as explained above.
(1) The ratio of the dimple total capacity to the volume of the whole ball can be rationalized.
(2) The ball with which one does not exist [the great circle which does not intersect a dimple] is obtained.
(3) The geometric array of a dimple is improved and a golf ball with an equal distance between dimples is obtained.
(4) A ball without a seam line is obtained by the heights for dimple formation prepared in the metal mold parting pla

Therefore, when the outstanding flight distance is obtained, the good stable golf ball of symmetry nature which flies according to the difference in the blow part of a ball, and a difference does not produce for the engine performance which flies and has the engine performance is obtained.

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TECHNICAL PROBLEM

[Description of the Prior Art] Since the dimple array and dimple configurations in a golf ball (a diameter, the depth, cross-section configuration, etc.) have big effect on the jump engine performance of a golf ball, in order that they ma raise the jump engine performance of a golf ball from the former, the geometric arranging method make the golf ball surface arrange many dimples equally or densely is proposed variously.
[0003] In this case, the request of a player to the jump engine performance of a golf ball has most things about increa of flight distance, and many players desire increase of the further flight distance.
[0004] Moreover, there is aerodynamic symmetric property as important jump engine performance of a golf ball. Th requires that a difference should arise neither on flight distance nor a ballistic trajectory wherever it may be specified the attached regulation of a golf regulation (Japan Golf Association), III, and a ball (C) and may hit [of a ball]. The conventional golf ball by which current marketing is carried out does not reach the level which all players may fully satisfy although it has this symmetric property in the range specified to the above-mentioned regulation, but the furth improvement is desired also about aerodynamic symmetric property.
[0005] That is, the so-called seam line exists and the usual golf ball by which current marketing is carried out is set t one of the causes by which this seam line degrades aerodynamic symmetric property. Although this seam line is a virtual great circle which the dimple formed in the joint of that metal mold and metal mold does not intersect and exi in a golf ball unavoidably on that manufacture since a golf ball is fabricated with the metal mold with a semi-sphere-like shaping side of a 2nd page rate In the golf ball which has this seam line As shown in drawing 8 So that the straig line e passing through the two central point d of c, c, and Ball a which counters mutually [the seam line b] may serv as the axis of rotation It is easy to produce a difference in the ballistic trajectory and flight distance of a ball in seam **** (drawing 8 (B)) blow i Carried out as [serve as / the straight line h passing through the two-poles point (pole) and the central point d when making into the equator pole **** (drawing 8 (A)) and the seam line b to blow f carry out / the axis of rotation].
[0006] In this case, even if it is some, especially when an unsymmetrical ball is used aerodynamically, in the golfer's an upper person or a pro's level, this asymmetry may lead to destabilization of a shot and improvement in this aerodynamic symmetric property is also an important technical problem on the improvement in the jump engine performance of a golf ball.
[0007] This invention was made in view of the above-mentioned situation, and aims at offering the manufacture method of of the outstanding golf ball which flies and has the engine performance and this outstanding golf ball fligh distance and whose aerodynamic symmetric property improved.
[0008]
[The means for solving a technical problem and the gestalt of implementation of invention] In the golf ball with whic one does not exist [the great circle which does not intersect a dimple] in (1) surface in order that this invention may attain the above-mentioned purpose Volume of the virtual ball at the time of assuming that there is no dimple on the surface of [spherical] a ball is set to Amm3. The ratio VR of the total capacity of all the dimples occupied for the ba volume shown by x(B/A) 100 when total in the whole golf ball of the capacity of the dimple prepared on the surface the ball is set to Bmm3 On the golf ball and (2) ball surface which are characterized by being 0.6%<VR<1.5%, the congruent virtual spherical-surface equilateral hexagon of 12 pieces, and six congruent virtual spherical-surface equilateral quadrangles It draws so that it may be common in each one side of the virtual spherical-surface equilatera hexagon of four pieces to which it is surrounded by the virtual spherical-surface equilateral hexagon each virtual

spherical-surface equilateral quadrangle of whose is four pieces, and the four sides of each virtual spherical-surface equilateral quadrangle surround the virtual spherical-surface equilateral quadrangle concerned. Furthermore, by drawing the three diagonal lines on a total virtual spherical-surface equilateral hexagon, respectively, and carrying ou the division-into-equal-parts rate of each virtual spherical-surface equilateral hexagon to the virtual spherical triangle six pieces The ball surface is divided into the virtual spherical triangle of 72 pieces, and six virtual spherical-surface equilateral quadrangles. The golf ball of the above (1) which arranged the dimple on the ball surface so that the insid of each above-mentioned virtual spherical triangle might serve as the same dimple array and the inside of each above mentioned virtual spherical-surface equilateral quadrangle might serve as the same dimple array, And the golf ball of the above (2) with which the dimple of the same number intersects each sides of all that form a (3) 72 piece virtual spherical triangle and six virtual spherical-surface equilateral quadrangles is offered.

[0009] Namely, while preventing the fall of the symmetric property resulting from existence of the seam line which arranged the dimple and was mentioned above so that one may not exist, the great circle which does not intersect a dimple on the surface the golf ball of above-mentioned this invention By arranging a dimple so that the ratio (the dimple total volume ratio) VR of the total capacity of all the dimples occupied for ball volume may serve as the abov mentioned value, the volume ratio of a dimple is rationalized and increase of flight distance is attained.

[0010] In this case, the ball surface is divided into the virtual spherical triangle of 72 pieces, and six virtual spherical surface equilateral quadrangles like the above (2). By arranging a dimple so that the inside of each above-mentioned virtual spherical triangle may serve as the same dimple array and the inside of each above-mentioned virtual spherica surface equilateral quadrangle may serve as the same dimple array A dimple can be arranged so that all the surfaces a ball may be covered and the equal dimple effect may be acquired, and aerodynamic symmetric property can be rais more certainly. Still like the above (3) So that the dimple of the same number may intersect each sides of all that form the virtual spherical triangle of 72 pieces, and six virtual spherical-surface equilateral quadrangles By arranging a dimple, the distance between dimples becomes equal with the whole ball, and can obtain the golf ball which has the extremely excellent aerodynamic symmetric property.

[0011] moreover, this invention as the manufacture method for obtaining the golf ball of above-mentioned this invention (4) While forming the spherical mold cavity which joins the half-mold of a pair with which much heights f dimple shaping were formed in the semi-sphere-like mold cavity inside disengageable and by which much heights fo dimple shaping were formed in inner skin In the manufacture method of the golf ball which fabricates around a core cover layer which carries out arrangement maintenance of the core in the core in this spherical mold cavity, supplies covering molding material to the gap formed between this core and mold cavity inner skin, and has many dimples Establish a ******** mold cavity and two or more pin insertion slots open for free passage in a both above-mention ** type mating face, and a dimple shaping pin is arranged in this pin insertion slot so that a point may project in a mo cavity. Form the heights for dimple shaping on the parting line of a mold cavity by the point of this dimple shaping p and the great circle which does not intersect the above-mentioned heights for dimple shaping at inner skin constitute the mold cavity in which one does not exist. The above (1) The manufacture method of the golf ball characterized by manufacturing one golf ball of - (3), And arrange (5) dimple shaping pin possible [an attitude], make it march out in the mold cavity of metal mold, and a core is held to the core of a mold cavity by this dimple shaping pin. A covering molding material is supplied to the gap formed between a core and mold cavity inner skin in this condition. Just befo filling up with a covering molding material completely, the above-mentioned dimple shaping pin is retreated to a dimple formation location, and the manufacture method of the golf ball the above (4) in which the dimple was forme on the parting line of metal mold is offered.

[0012] Namely, while the manufacture method of above-mentioned this invention arranges a core in the mold cavity this metal mold using the molding die of the 2nd page rate which consists of a half-mold of the pair which has a sem sphere-like mold cavity and injection molding a covering molding material around this core While preparing the heights for dimple shaping formed in the mold cavity inner skin of the above-mentioned metal mold so that the dimp array of above-mentioned (1) - (3) may be satisfied in case a dimple is formed in this covering A dimple shaping pin arranged in a both ** type mating face so that the point may project in a mold cavity. By forming the heights for dimple shaping on the parting line of a mold cavity by the point of this dimple shaping pin, and forming a dimple on the parting line of metal mold by this dimple shaping pin point The golf ball with which one does not exist [the grea circle which does not intersect a dimple] is obtained on the surface.

[0013] In this case, until just before arranging the above-mentioned dimple shaping pin possible [an attitude] and

being filled up with a covering molding material like the above (5), it can be used as a support pin which holds the c in a mold cavity to the core of this mold cavity

[0014] Hereafter, lessons is taken from this invention and it explains in more detail. The golf ball of this invention is constituted so that the ratio (the dimple total volume ratio) VR of the total capacity of all the dimples that do not hav at all the great circle which a dimple does not intersect as mentioned above, and are occupied for the above-mentione ball volume may become 0.6%<VR<1.5%.

[0015] When volume of the virtual ball at the time of assuming that the above-mentioned dimple total volume ratio V does not have a dimple on the surface of [spherical] a ball is set to Amm3 and total in the whole golf ball of the capacity of the dimple prepared on the surface of the ball is set to Bmm3, it is the value shown by x(B/A) 100. It can ask for the volume A of the above-mentioned virtual ball by A=4/3x(radius of virtual ball)3xpi like the case where it asks for the volume of the usual ball here. Moreover, the total B of the above-mentioned dimple capacity For examp what is necessary is to ask by x (capacity of one dimple (VD)) (total of a dimple), when the number of dimples is on and just to add these in quest of total of the capacity similarly about each dimple, when there are two or more sorts o dimples further. In this case, as shown in drawing 1 (A) and (B), the above-mentioned dimple capacity VD can make x axis the straight line on the virtual plane which intersects perpendicularly with the y-axis and this y-axis the straigh line which passes along Dm, the deepest section of a dimple 1, and the center of the virtual plane 3 the diameter of th circular virtual plane 3 surrounded by the rim 2 of a dimple 1, and can ask for it by the following formula (1).

[0016]

[Equation 1]

$$VD=\int_0^{\frac{Dm}{2}} 2\pi xydx \qquad \cdots (1)$$

[0017] in addition, one sort from which the class of dimple formed in the ball surface in this invention differs in a diameter and/or the depth mutually -- or two or more sorts are preferably made into about 1-3 kinds. Although the number of dimples will decrease if especially the magnitude of one dimple is not restricted, its number of dimples naturally increases a dimple in order to satisfy a small thing, then the above-mentioned dimple total volume ratio VR and it enlarges a dimple, about 2-5mm and the depth usually have [the diameter of a dimple] about 0.07-0.30mm desirable [moreover,]. As for the total B of the above-mentioned dimple capacity, it is desirable that 3, and 325-447mm thing which becomes about three are especially desirable, and especially 250-600 dimple totals consider as 350-500 pieces 244-610mm.

[0018] The golf ball of this invention designs a dimple so that the dimple total volume ratio VR called for by doing i this way may exceed 0.6% and it may become less than 1.5%, and preferably, it designs a dimple so that VR may become 0.85 - 0.95% more preferably 0.8 to 1%. Although the lift which a turbulent flow can be effectively generate to the perimeter of a ball during a golf ball flight by this, and air resistance can be decreased, and is produced in connection with the backspin of a golf ball can be rationalized and the flight distance of a golf ball can be increased I this case, in this invention, while making the above-mentioned dimple total volume ratio VR into the above-mention value The great circle which does not intersect the ball surface with a dimple raises the aerodynamic symmetric property mentioned above by arranging a dimple, as not existed in one, either, and it raises flight distance and symmetric property to coincidence.

[0019] The array of a dimple may be which array here, as long as it makes it the great circle which a dimple does no intersect as mentioned above not arise on the ball surface. Although the ball surface can be divided by well-known s plot experiments, such as positive 8 face piece, positive 12 face piece, and positive 20 face piece, and a dimple can b equally arranged to each division field The ball surface is divided into the virtual spherical triangle of 72 pieces, and virtual spherical-surface equilateral quadrangles especially in this invention. So that the inside of each above-mentioned virtual spherical triangle may serve as the same dimple array and the inside of each above-mentioned virt spherical-surface equilateral quadrangle may serve as the same dimple array It can be desirable to arrange a dimple a aerodynamic symmetric property can be raised more certainly by this. Furthermore, so that the dimple of the same number may intersect each sides of all that form the virtual spherical triangle of the 72 above-mentioned pieces, and six above-mentioned virtual spherical-surface equilateral quadrangles in this case It is more desirable to arrange a dimple, and thereby, the distance between dimples becomes equal with the whole ball, and can obtain the golf ball which has the extremely excellent aerodynamic symmetric property.

[0020] The array specifically shown in drawing 2 , the array shown in 3, the array shown in drawing 4 , and drawing can be illustrated. As shown in drawing 2 -5, mutually with the congruent virtual spherical-surface equilateral hexag 4 of 12 pieces on the ball surface namely, six congruent virtual spherical-surface equilateral quadrangles 5 It draws s that it may be common in each one side of the virtual spherical-surface equilateral hexagon 4 of four pieces to which each virtual spherical-surface equilateral quadrangle 5 is surrounded by the virtual spherical-surface equilateral hexagon 4 of four pieces, and the four sides of each virtual spherical-surface equilateral quadrangle 5 surround the virtual spherical-surface equilateral quadrangle 5 concerned. Furthermore, the thing for which the three diagonal line 6, 6, and 6 are drawn on the total virtual spherical-surface equilateral hexagon 4, respectively, and each virtual spherical-surface equilateral hexagon 4 is divided into the virtual spherical triangle 7--7 of six pieces (by a diagram) The ball surface which showed the diagonal line 6 only to the virtual spherical-surface hexagon of 1 is divided into t virtual spherical triangle 7 of 72 pieces, and six virtual spherical-surface equilateral quadrangles 5. A dimple is arranged so that the inside of each above-mentioned virtual spherical triangle 7 may serve as the same dimple array a the inside of each above-mentioned virtual spherical-surface equilateral quadrangle 5 may serve as the same dimple array.

[0021] Furthermore, as for the number of the dimples which it is desirable to make into the same number (3 four and drawing 4 drawing 2 and five) the number of dimples which crosses each side which forms each above-mentioned virtual spherical triangle 7 and each virtual spherical-surface equilateral quadrangle 5 like drawing 2 , the array of 3, and the array of drawing 4 , and cross each side in this case, it is desirable to usually consider as 3-5 pieces.

[0022] In addition, the above-mentioned drawing 2 -5 do not explain the split plot experiment on the surface of a bal dimple array is not limited to these arrays, but the inside of each above-mentioned virtual spherical triangle 7 serves the same dimple array, and it should just turn into a dimple array with the same inside of each above-mentioned virtu spherical-surface equilateral quadrangle 5. Moreover, the method of dividing the ball surface into the virtual spherica surface equilateral hexagon 4 of the 12 above-mentioned pieces and six virtual spherical-surface equilateral quadrangles 5 can be performed by the following method.

[0023] Namely, as shown in drawing 6 , while drawing the median line 21--21 from each top-most vertices of each spherical-surface equilateral triangle which divides the ball surface into positive 8 well-known face piece first (the inside of drawing and a reference mark 20 are the parting line of positive 8 face piece), and constitutes spherical-surface positive 8 obtained face piece By drawing the above-mentioned virtual spherical-surface equilateral quadran 5 on the sense to which a vertical angle is located in each top-most-vertices field of the spherical-surface positive 8 above-mentioned face piece on the above-mentioned median line 21, and forming the above-mentioned virtual spherical-surface equilateral hexagon 4 further in one side and the above-mentioned median line 21 of this virtual spherical-surface equilateral quadrangle 5 The ball surface can be divided into the virtual spherical-surface equilatera hexagon 4 of 12 pieces, and six virtual spherical-surface equilateral quadrangles 5.

[0024] The golf ball of this invention arranges a dimple as mentioned above, and there is especially no limit in structure, a material, etc. of a ball, and it is good for them also as a spool golf ball also as solid golf balls, such as a o piece ball and a two-piece ball, using the usual material. Furthermore, magnitude, weight, etc. can be suitably set up according to a golf regulation.

[0025] moreover, in the manufacture method's also being able to adopt the usual method, for example, considering a two-piece solid golf ball While forming the spherical mold cavity which joins the half-mold of a pair with which mu heights for dimple shaping were formed in the semi-sphere-like mold cavity inside disengageable and by which muc heights for dimple shaping were formed in inner skin Although it can manufacture by the method of fabricating arou a core the cover layer which carries out arrangement maintenance of the core in the core in this spherical mold cavity supplies a covering molding material to the gap formed between this core and mold cavity inner skin, and has many dimples As the golf ball of this invention was mentioned above, the great circle which one dimple does not intersect, either is that to which one does not exist in the ball surface. Therefore, it is necessary to fabricate so that the seam lin (great circle which a dimple does not intersect) formed in the metal mold parting plane which existed in the conventional golf ball may not be generated.

[0026] As a method of fabricating such a golf ball For example, as shown in drawing 7 , the ******** mold cavity 9 and two or more pin insertion slots 10 and 10 open for free passage are established in the mating face of both the ** types 8a and 8b that constitute metal mold. The dimple shaping pins 11 and 11 are arranged in these pin insertion slo 10 and 10 so that a point may project in a mold cavity 9. The heights for dimple shaping are formed on the parting li

of a mold cavity 9 by the point of these dimple shaping pins 11 and 11, and the method it is made for the above-mentioned seam line not to produce is adopted preferably. In addition, the reference marks 12 in drawing 7 are the co of a golf ball, and the cover layer by which 13 was fabricated.

[0027] Furthermore, when this invention golf ball is manufactured by the method of this drawing 7 , Arrange the above-mentioned dimple shaping pins 11 and 11 possible [an attitude], make it march out in the mold cavity 9 of metal mold, and a core 12 is held to the core of a mold cavity 9 by these dimple shaping pins 11 and 11. A covering molding material is supplied to the gap formed between a core 12 and mold cavity 9 inner skin in this condition. Just before filling up with a covering molding material completely, the above-mentioned dimple shaping pins 11 and 11 a retreated to a dimple formation location (illustrated condition), and a dimple can be formed on the parting line of me mold.

[0028] In addition, although one does not exist, the great circle which does not intersect the heights for dimple shapi at inner skin the mold cavity of the metal mold which fabricates the golf ball of this invention Furthermore, volume o the virtual ball at the time of assuming that there is no dimple in the spherical surface of the golf ball obtained is set Amm3. The ratio (the dimple total volume ratio) VR of the total capacity of all the dimples occupied for the ball volume shown by x(B/A) 100 when total in the whole ball of the capacity of the above-mentioned dimple is set to Bmm3 The above-mentioned heights for dimple shaping are designed so that the golf ball used as 0.6%<VR<1.5% m be obtained, and the golf ball of this invention which has the dimple array which this mentioned above is obtained.

[Translation done.]

* NOTICES *

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EXAMPLE

[Example] Next, although an example and the example of a comparison show the effect of this invention concretely, this invention is not limited to the following example.
[0031] Drawing 2 and the two-piece solid golf ball of the large size which has the dimple array shown in 3 were manufactured using the molding die of drawing 7 mentioned above. This golf ball is 380 dimple numbers, 3.8mm (o kind) of diameters of a dimple, and 0.92% of VR values.
[0032] The pole blow (the direction of (A) drawing arrow head f) and seam blow (the direction of (B) drawing arrow head i) which were shown in drawing 8 (A) and (B) were performed having assumed the great-circle portion which i equivalent to the parting plane of metal mold in this golf ball to be a seam line, and a carry, a run, and total flight distance were measured. A result is shown in a table 1. Moreover, measurement same about the two-piece solid golf ball (those with a seam line, the number of dimples which a dimple does not intersect 392 pieces, 3.63mm (one kind diameters of a dimple, 0.92% of VR values) of the large size which has drawing 9 formed with the material same as comparison and the dimple array shown in 10 was performed. A result is written together to a table 1. In addition, us the swing robot, by head speed 45 m/sec, the blow was made as the repeat 10 times and the blow test made the avera measured value with the driver (driver).
[0033]
[A table 1]

		実施例	比較例
キャリー	ボール打撃 (m)	213	213
	シーム打撃 (m)	214	211
ラン	ボール打撃 (m)	14	11
	シーム打撃 (m)	13	15
トータル	ボール打撃 (m)	227	224
	シーム打撃 (m)	227	226

[0034] To the top where this invention golf ball has good symmetry nature, flight distance also increased and has checked the outstanding thing for which it flies and has the engine performance as shown in a table 1.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is explanatory drawing for asking for a dimple capacity of one piece in this invention, and (A) shows outline perspective diagram and (B) shows an outline cross section.
[Drawing 2] It is dimple array pattern drawing of the golf ball concerning one example of this invention.
[Drawing 3] It is dimple array pattern drawing seen from another angle of this golf ball.
[Drawing 4] It is dimple array pattern drawing of the golf ball concerning other examples of this invention.
[Drawing 5] It is dimple array pattern drawing of the golf ball applied to another example of this invention again.
[Drawing 6] It is explanatory drawing explaining how to divide the golf ball surface into the virtual spherical-surface equilateral hexagon of 12 pieces, and six virtual spherical-surface equilateral quadrangles.
[Drawing 7] It is the outline cross section showing an example of the metal mold for obtaining this invention golf ba
[Drawing 8] It is explanatory drawing explaining the blow direction in the case of carrying out the shot of the golf ba and (A) shows a pole blow and (B) shows a seam blow.
[Drawing 9] It is dimple array pattern drawing of the golf ball concerning the example of a comparison.
[Drawing 10] It is dimple array pattern drawing seen from another angle of this golf ball.
[Description of Notations]
1 Dimple
4 Virtual Spherical-Surface Equilateral Hexagon
5 Virtual Spherical-Surface Equilateral Quadrangle
6 Diagonal Line
7 Virtual Spherical Triangle
8a, 8b Half-mold
9 Mold Cavity
10 Pin Insertion Slot
11 Dimple Shaping Pin
12 Core
13 Cover Layer

[Translation done.]

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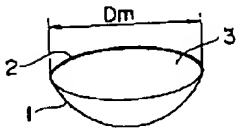
DRAWINGS

[Drawing 1]

(A)



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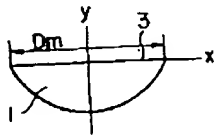
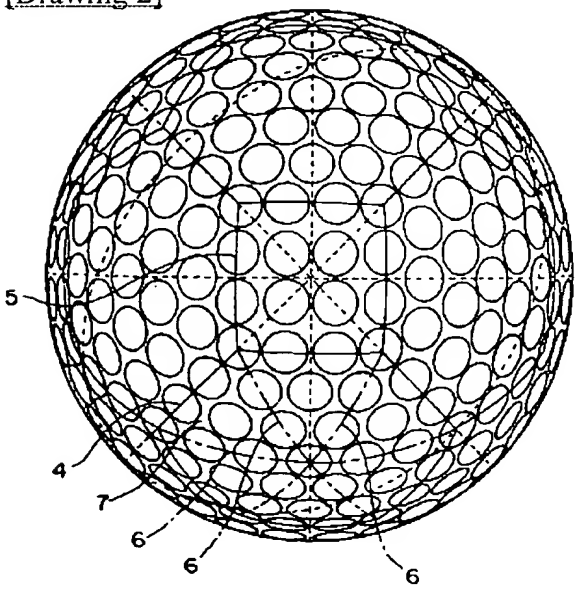
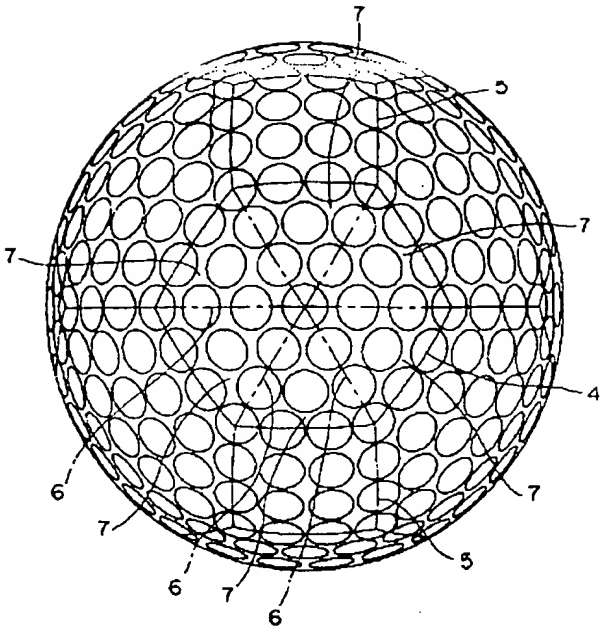


[Drawing 2]

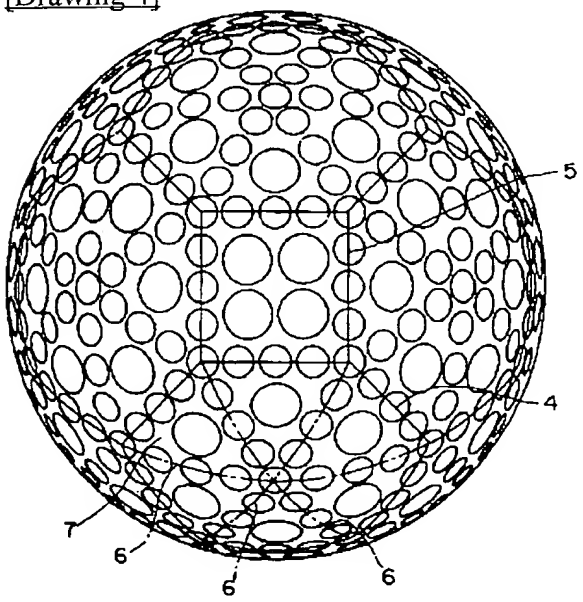


[Drawing 3]

h g cg h eh cg e e

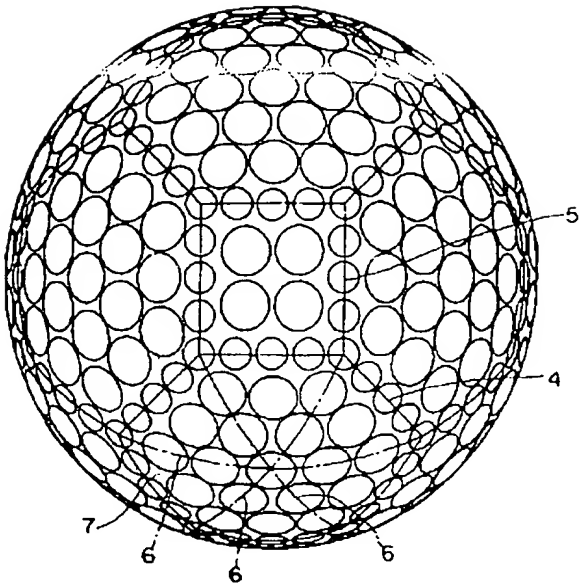


[Drawing 4]

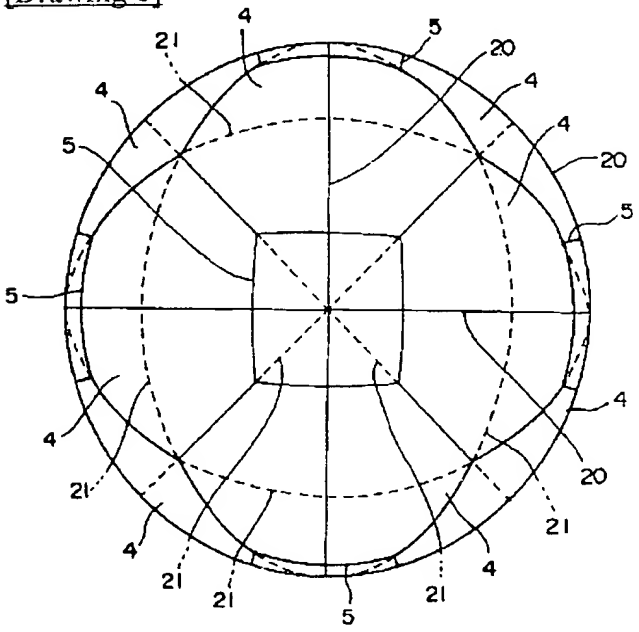


[Drawing 5]

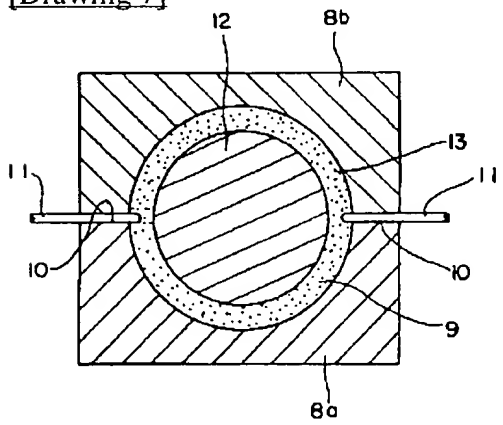
h g cg h eh cg e e



[Drawing 6]



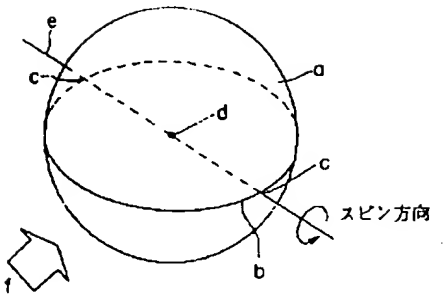
[Drawing 7]



[Drawing 8]

h g cg h eh cg e e

(A)



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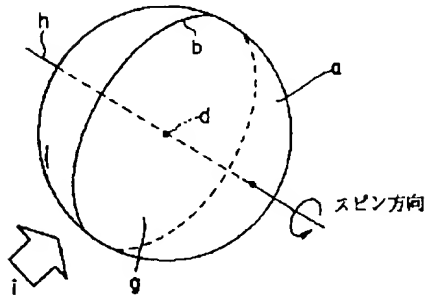
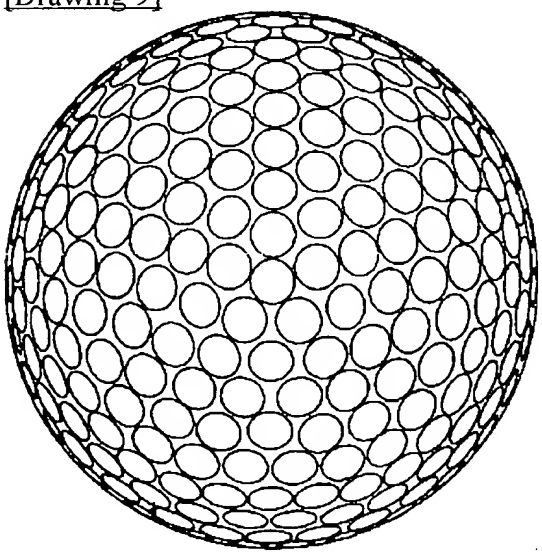
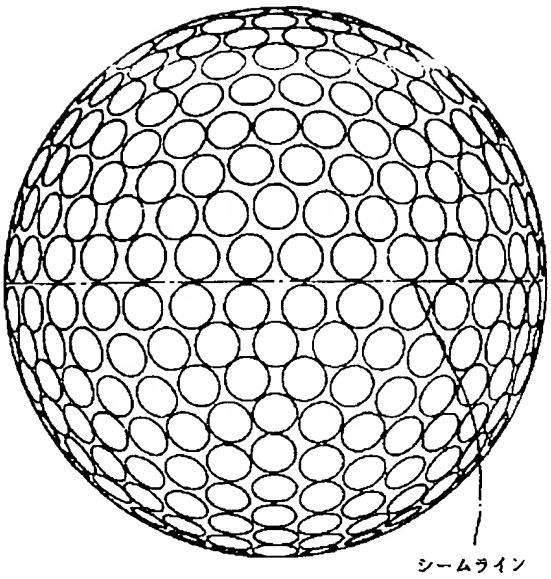


[Drawing 9]



[Drawing 10]

h g cg h eh cg e e



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